COLLISION REPAIR: NON-STRUCTURAL

COURSE DESCRIPTION

Collision Repair: Non-Structural is a course that prepares students to analyze non-structural collision damage to a vehicle, determine the extent of the damage and the direction of impact, initiate an appropriate repair plan, and correctly use equipment to fit metal to a specified dimension within tolerances. Course content includes metal finishing, body filling, and glass panel replacements. The course prepares students for entry level employment and advanced training in collision repair technology, and post-secondary education. Students completing the *Collision Repair: Non-Structural* are eligible to take the ASE written examination for Non-Structural Analysis and Damage Repair.

Recommended: Transportation Core
Algebra I; Physical Science or Principles of Technology I, Principles of Welding (100 hours) (may be concurrent)

Requirement: A minimum of 300 hours must be dedicated to non-structural analysis and damage repair without MIG welding. 375 hours with MIG welding to meet minimum standards set by NATEF.

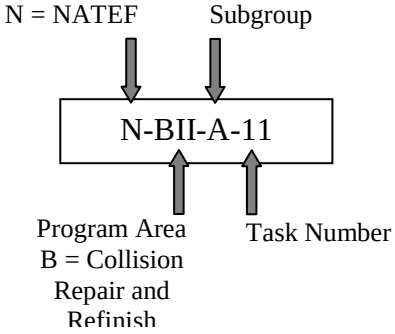
Recommended Credits: Non-NATEF programs – 2 credits
NATEF programs – Option for 3 credits

Recommended Grade Level(s): 10th, 11th or 12th

Number of Competencies in Course: Non-NATEF Certified Programs – 70
(HP-I) High Priority Individual

NATEF Certified Programs - 89
NATEF minimums:
HP-I – 95% (High Priority Individual)
HP-G – 90% (High Priority Group)

Notes: Course is aligned with NATEF tasks list for Collision Repair and Refinish - Non Structural Analysis and Damage Repair. Items have been organized based on the requirements of the Tennessee required course description format. NATEF tasks are referenced with the corresponding Performance Standards. Codes are as follows:



COLLISION REPAIR: NON-STRUCTURAL STANDARDS

STANDARDS

1.0 Students will perform safety examinations and maintain safety records.

2.0 Students will demonstrate leadership, citizenship, and teamwork skills required for success in the school, community, and workplace.

3.0 Students will integrate reading, writing, math, and science skills and understand the impact of academic achievement in the workplace.

4.0 Students will demonstrate proper procedures for preparing body components.

5.0 Students will demonstrate proper procedures for repairing outer body panels, replacements, and adjustments.

6.0 Students will demonstrate proper procedures for metal finishing and body filling.

7.0 Students will demonstrate proper procedures for repairing movable glass and hardware.

8.0 Students will properly perform welding and cutting techniques.

9.0 Students will demonstrate proper procedures for repairing plastics and adhesives.

COLLISION REPAIR: NON-STRUCTURAL

STANDARD 1.0

Students will perform safety examinations and maintain safety records.

LEARNING EXPECTATIONS

The student will:

1.1 Demonstrate a positive attitude regarding safety practices and issues.
1.2 Use and inspect personal protective equipment.
1.3 Inspect, maintain, and employ safe operating procedures with tools and equipment, such as hand and power tools, ladders, scaffolding, and lifting equipment.
1.4 Demonstrate continuous awareness of potential hazards to self and others and respond appropriately.
1.5 Assume responsibilities under HazCom (Hazard Communication) regulations.
1.6 Adhere to responsibilities, regulations, and Occupational Safety & Health Administration (OSHA) policies to protect coworkers and bystanders from hazards.
1.7 Adhere to responsibilities, regulations, and Occupational Safety & Health Administration (OSHA) policies regarding reporting of accidents and observed hazards, and regarding emergency response procedures.
1.8 Demonstrate appropriate related safety procedures.
1.9 Pass with 100 % accuracy a written examination relating to safety issues
1.10 Pass with 100% accuracy a performance examination relating to safety.
1.11 Maintain a portfolio record of written safety examinations and equipment examinations for which the student has passed an operational checkout by the instructor.

PERFORMANCE INDICATORS: EVIDENCE STANDARD IS MET

The student:

1.1A Is attentive during safety discussions.
1.1B Actively seeks information about safe procedures.
1.1C Responds positively to instruction, advice, and correction regarding safety issues.
1.1D Does not deliberately create or increase hazards, such as by horseplay, practical jokes, or creating distractions.
1.1E Reports to school or work physically ready to perform to professional standards, such as rested, or not impaired by medications, drugs, alcohol, etc.
1.2 Selects, inspects, and uses the correct personal protective equipment for the assigned task.
1.3A Inspects power tools for intact guards, shields, insulation, and other protective devices.
1.3B Inspects extension cords for the presence of a functional ground connection, prior to use.
1.3C Operates and maintains tools in accordance with manufacturer's instructions and as required by regulation or company policy.
1.4A Is observant of personnel and activities in the vicinity of the work area.
1.4B Warns nearby personnel, prior to starting potentially hazardous actions.
1.5A When asked to use a new hazardous material, retrieves MSDSs (material safety data sheets), and identifies the health hazards associated with the new material.
1.5B Reports hazards found on the job site to the supervisor.

1.6A Erects shields, barriers, and signage to protect coworkers and bystanders prior to starting potentially hazardous tasks.
1.6B Provides and activates adequate ventilation equipment as required by the task.
1.7A Reports all injuries to self to the immediate supervisor.
1.7B Reports observed unguarded hazards to their immediate supervisor.
1.8A Complies with personal assignments regarding emergency assignments.
1.9A Passes with 100% accuracy a written examination relating specifically to content area.
1.10A Passes with 100% accuracy a performance examination relating specifically to welding tools, equipment and supplies.
1.11A Maintains a portfolio record of written safety examinations and equipment examinations for which the student has passed an operational checkout by the instructor.

SAMPLE PERFORMANCE TASKS

These are sample projects of the type and scale recommended to address one or more of the learning expectations for this standard. Other projects can be used at the instructor's discretion.

- Conduct a practice drill simulating a hazardous solvent spill in which an emergency action plan is to be implemented.
- Instruct a visitor to obviously approach the vicinity of a student conducting a hazardous activity and note the level of awareness demonstrated by the student.
- For a project requiring the use of ladders and/or scaffolding, note the proper placement and securing procedures followed by students.

INTEGRATION LINKAGES

Language Arts, Mathematics, Technical Algebra, Technical Geometry, Algebra, Geometry English IV: Communication for Life, SkillsUSA Technical Championships, American Welding Society (AWS), Guide for Training and Qualification of Entry Level Welder, National Center for Construction Education Research (NCCER), Secretary's Commission on Achieving Necessary Skills (SCANS), Professional Development Program, SkillsUSA

COLLISION REPAIR: NON-STRUCTURAL

STANDARD 2.0

Students will demonstrate leadership, citizenship, and teamwork skills required for success in the school, community, and workplace.

LEARNING EXPECTATIONS

The student will:

2.1 Cultivate positive leadership skills.
2.2 Participate in the student organization directly related to their program of study as an integral part of classroom instruction.
2.3 Assess situations, apply problem-solving techniques and decision-making skills within the school, community, and workplace.
2.4 Participate as a team member in a learning environment.
2.5 Respect the opinions, customs, and individual differences of others.
2.6 Build personal career development by identifying career interests, strengths, and opportunities.

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

2.1A Demonstrates character and leadership using creative-and critical-thinking skills.
2.1B Uses creative thought process by "thinking outside the box."
2.2A Relates the creed, purposes, motto, and emblem of their student organization, directly related to personal and professional development.
2.2B Plans and conducts meetings and other business according to accepted rules of parliamentary procedure.
2.3A Makes decisions and assumes responsibilities.
2.3B Analyzes a situation and uses the Professional Development Program or career technical student organization materials directly related to the student's program of study to resolve it.
2.3C Understands the importance of learning new information for both current and future problem solving and decision making.
2.4A Organizes committees and participates in functions.
2.4B Cooperates with peers to select and organize a community service project.
2.5A Researches different customs and individual differences of others.
2.5B Interacts respectfully with individuals of different cultures, gender, and backgrounds.
2.5C Resolves conflicts and differences to maintain a smooth workflow and classroom environment.
2.6A Creates personal career development by identifying career interests, strengths, and opportunities.
2.6B Identifies opportunities for career development and certification requirements.
2.6C Plans personal educational paths based on available courses and current career goals.
2.6D Creates a resumé that reflects student's skills, abilities, and interests.

SAMPLE PERFORMANCE TASKS

- Create a leadership inventory and use it to conduct a personal assessment.
- Participate in various career technical student organizations' programs and/or competitive events.
- Implement an annual program of work.
- Prepare a meeting agenda for a specific career technical student organization monthly meeting.
- Attend a professional organization meeting.
- Develop a program of study within their career opportunities.
- Participate in the American Spirit Award competition with SkillsUSA.
- Complete *Professional Development Program Level I and Level II*, SkillsUSA.

INTEGRATION LINKAGES

SkillsUSA, *Professional Development Program*; SkillsUSA; Communications and Writing Skills; Teambuilding Skills; Research; Language Arts; Sociology; Psychology; Math; Technical Math; English IV: Communication for Life; Social Studies; Problem Solving; Interpersonal Skills; Employability Skills; Critical-Thinking Skills; Secretary's Commission on Achieving Necessary Skills (SCANS); Chamber of Commerce; Colleges; Universities; Technology Centers; Secretary's Commission on Achieving Necessary Skills (SCANS)

COLLISION REPAIR: NON-STRUCTURAL

STANDARD 3.0

Students will integrate reading, writing, math, and science skills and understand the impact of academic achievement in the work place.

LEARNING EXPECTATIONS

The student will:

3.1 Assume responsibility for accomplishing classroom assignments and workplace goals within accepted time frames.
3.2 Develop advanced study skills.
3.3 Demonstrate and use written and verbal communication skills.
3.4 Read and understand technical documents such as regulations, manuals, reports, forms, graphs, charts, and tables.
3.5 Apply the foundations of mathematical principles such as algebra, geometry, and advanced math to solve problems.
3.6 Apply basic scientific principles and methods to solve problems and complete tasks.
3.7 Understand computer operations and related applications to input, store, retrieve, and output information as it relates to the course.
3.8 Research, recognize, and understand the interactions of the environment and *green* issues as they relate to the course work and to a global economy.

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

3.1A Uses appropriate time management to achieve goals.
3.1B Arrives at school on time each day.
3.1C Completes assignments and meets deadlines.
3.2A Assesses current personal study skills.
3.2B Demonstrates advanced note-taking ability.
3.2C Formulates appropriate study strategies for given tasks.
3.3A Communicates ideas, information, and messages in a logical manner.
3.3B Fills out forms, reports, logs, and documents to comply with class and project requirements.
3.4A Reads and understands technical documents and uses industry jargon, acronyms, and terminology appropriately.
3.4B Recognizes the meaning of specialized words or phrases unique to the career and industry.
3.5A Utilizes computation in adding, subtracting, multiplying, and dividing of whole numbers, fractions, decimals, and percents.
3.5B Chooses the right mathematical method or formula to solve a problem.
3.5C Performs math operations accurately to complete classroom and lab tasks.
3.6A Understands scientific principles critical to the course.
3.6B Applies scientific principles and technology to solve problems and complete tasks.
3.6C Has knowledge of the scientific method (e.g., identifies the problem, collects information, forms opinions, and draws conclusions).

3.7A Uses basic computer hardware (e.g., PCs, printers) and software to perform tasks as required for the course work.
3.7B Understands capabilities of computers and common computer terminology (e.g., program, operating system).
3.7C Applies the appropriate technical solution to complete tasks.
3.7D Inputs data and information accurately for the course requirements.
3.8A Researches and recognizes *green* trends in career area and industry.
3.8B Examines current environmentally-friendly trends.
3.8C Applies sustainability practices by understanding processes that are non-polluting, conserving of energy and natural resources, and economically efficient.

SAMPLE PERFORMANCE TASKS

- Examine and compile different learning styles for portfolios.
- Create calendars containing all activities and obligations for one month. Discusses how to handle conflicting or competing obligations then complete daily and weekly plans showing tasks, priorities, and scheduling.
- Complete self-assessments of study habits.
- Compute precise and exact measurements.
- Explore study strategies for different subjects and tasks then analyze two homework assignments and select the best strategies for completing them.
- Create "life maps" showing necessary steps or "landmarks" along the path to personal, financial, educational, and career goals.
- Take notes during counselor classroom visits and work in small groups to create flow charts of the path options.
- List attitudes that lead to success then rate individually in these areas. Work together to suggest strategies for overcoming the weaknesses identified own and partners' self-assessments then share with the class the strategies developed.
- Research the Internet and other technology to collect and analyze data concerning climate change.
- Keep a data file of alternative energy sources and the sources' impact on the environment.
- Develop a recycling project at home or for the school environment.

INTEGRATION LINKAGES

SkillsUSA, *Professional Development Program*; SkillsUSA; Communications and Writing Skills; Teambuilding Skills; Research; Language Arts; Sociology; Psychology; Math; Technical Math; English IV: Communication for Life; Social Studies; Problem Solving; Interpersonal Skills; Employability Skills; Critical-Thinking Skills; Secretary's Commission on Achieving Necessary Skills (SCANS); Chamber of Commerce; Colleges; Universities; Technology Centers; Secretary's Commission on Achieving Necessary Skills (SCANS)

COLLISION REPAIR: NON-STRUCTURAL

STANDARD 4.0

Students will demonstrate proper procedures for preparing vehicles for repair.

LEARNING EXPECTATIONS

The student will:

4.1 Review damage report and analyze damage to determine appropriate methods for overall repair; develop and document a repair plan. HP-I
4.2 Inspect, remove, store, and replace exterior trim and moldings. HP-I
4.3 Inspect, remove, store, and replace interior trim and components. HP-I
4.4 Inspect, remove, store, and replace body panels and components that may interfere with or be damaged during repair. HP-I
4.5 Inspect, remove, store, and replace vehicle mechanical and electrical components that may interfere with or be damaged during repair. HP-G
4.6 Protect panels, glass, and parts, and other vehicles adjacent to the repair area. HP-G
4.7 Soap and water wash entire vehicle for inspection. HP-I
4.8 Prepare damaged area using water-based and solvent-based cleaners. HP-I
4.9 Remove corrosion protection, undercoatings, sealers, and other protective coatings as necessary to perform repairs. HP-I
4.10 Inspect, remove, and reinstall reparable plastics and other components for off-vehicle repair. HP-G

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

4.1 Reviews damage report and analyzes damage to determine appropriate methods for overall repair; develops and documents a repair plan.
4.2 Inspects, removes, stores, and replaces exterior trim and moldings.
4.3 Inspects, removes, stores, and replaces interior trim and components.
4.4 Inspects, removes, stores, and replaces body panels and components that may interfere with or be damaged during repair.
4.5 Inspects, removes, stores, and replaces vehicle mechanical and electrical components that may interfere with or be damaged during repair.
4.6 Protects panels, glass, and parts, and other vehicles adjacent to the repair area.
4.7 Soap and water washes entire vehicle for inspection.
4.8 Prepares damaged area using water-based and solvent-based cleaners.
4.9 Removes corrosion protection, undercoatings, sealers, and other protective coatings as necessary to perform repairs.
4.10 Inspects, removes, and reinstalls reparable plastics and other components for off-vehicle repair.

SAMPLE PERFORMANCE TASKS

- Develop a repair plan for a damaged vehicle.
- Remove any components that might be damaged during repair.

INTEGRATION LINKAGES

Math, Science, Chemistry, Physics, Communication Skills, Teamwork Skills, Reading Skills, Leadership Skills, Problem Solving and Critical Thinking Skills, computer Skills, Art and Design, Computer Aided Design, Secretary's Commission on Achieving Necessary Skills (SCANS), National Institute for Automotive Service Excellence, (ASE) National Automotive Technician Education Foundation (NATEF), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), SkillsUSA

COLLISION REPAIR: NON-STRUCTURAL

STANDARD 5.0

Students will demonstrate proper procedures for making outer body panel repairs, replacements, and adjustments.

LEARNING EXPECTATIONS

The student will:

5.1 Determine the extent of direct and indirect damage and direction of impact; develop and document a repair plan. HP-I

5.2 Inspect, remove and replace bolted, bonded, and welded steel panel or panel assemblies.HP-I

5.3 Determine the extent of damage to aluminum body panels; repair or replace in accordance with manufacturer's specifications. HP-G

5.4 Inspect, remove, replace, and align hood, hood hinges, and hood latch. HP-I

5.5 Inspect, remove, replace, and align deck lid, lid hinges, and lid latch. HP-I

5.6 Inspect, remove, replace, and align doors, tailgates, hatches, lift gates, latches, hinges, and related hardware. HP-I

5.7 Inspect, remove, replace, and align bumper bars, covers, reinforcement, guards, isolators, and mounting hardware. HP-I

5.8 Inspect, remove, replace and align front fenders, headers, and other panels. HP-I

5.9 Straighten and rough-out contours of damaged panels to a suitable condition for body filling or metal finishing using power tools, hand tools, and weld-on pull attachments. HP-I

5.10 Weld damaged or torn steel body panels; repair broken welds. HP-I

5.11 Restore corrosion protection. HP-I

5.12 Replace door skins according to manufacturer's procedures. HP-G

5.13 Restore sound deadeners and foam materials. HP-G

5.14 Perform panel bonding according to manufacturer's specifications. HP-G

5.15 Diagnose and repair water leaks, dust leaks, and wind noise. HP-G

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

5.1 Determines the extent of direct and indirect damage and direction of impact; develops and documents a repair plan.

5.2 Inspects, removes, and replaces bolted, bonded, and welded steel panel or panel assemblies

5.3 Determines the extent of damage to aluminum body panels; repairs or replaces in accordance with manufacturer's specifications.

5.4 Inspects, removes, replaces, and aligns hood, hood hinges, and hood latch.

5.5 Inspects, removes, replaces, and aligns deck lid, lid hinges, and lid latch.

5.6 Inspects, removes, replaces, and aligns doors, tailgates, hatches, lift gates, latches, hinges, and related hardware.

5.7 Inspects, removes, replaces, and aligns bumper bars, covers, reinforcement, guards, isolators, and mounting hardware.

5.8 Inspects, removes, replaces, and aligns front fenders, headers, and other panels.
5.9 Straightens and roughs-out contours of damaged panels to a suitable condition for body filling or metal finishing using power tools, hand tools, and weld-on pull attachments.
5.10 Welds damaged or torn steel body panels; repairs broken welds.
5.11 Restores corrosion protection.
5.12 Replaces door skins according to manufacturer's procedures.
5.13 Restores sound deadeners and foam materials.
5.14 Performs panel bonding according to manufacturer's specifications.
5.15 Diagnoses and repairs water leaks, dust leaks, and wind noise.

SAMPLE PERFORMANCE TASKS

- Examine a vehicle involved in a collision. Determine the extent of all outer body damage. Develop a strategy for repairing damage.
- Repair damaged steel body panel.

INTEGRATION LINKAGES

Math, Science, Chemistry, Physics, Communication Skills, Teamwork Skills, Reading Skills, Leadership Skills, Problem Solving and Critical Thinking Skills, computer Skills, Art and Design, Computer Aided Design, Secretary's Commission on Achieving Necessary Skills (SCANS), National Institute for Automotive Service Excellence, (ASE) National Automotive Technician Education Foundation (NATEF), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), SkillsUSA

COLLISION REPAIR: NON-STRUCTURAL

STANDARD 6.0

Students will demonstrate proper procedures for metal finishing and body filling.

LEARNING EXPECTATIONS

The student will:

6.1 Remove paint from the damaged area of a body panel. HP-I
6.2 Locate and repair surface irregularities on a damaged body panel. HP-I
6.3 Demonstrate hammer and dolly techniques. HP-I
6.4 Heat shrink stretched panel areas to proper contour. HP-I
6.5 Cold shrink stretched panel areas to proper contour. HP-I
6.6 Mix and apply body filler. HP-I
6.7 Rough sand body filler to contour; finish sand. HP-I
6.8 Determine the proper metal finishing techniques for aluminum. HP-G
6.9 Determine proper application of body filler to aluminum. HP-G

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

6.1 Removes paint from the damaged area of a body panel.
6.2 Locates and repairs surface irregularities on a damaged body panel.
6.3 Demonstrates hammer and dolly techniques.
6.4 Heat shrinks stretched panel areas to proper contour.
6.5 Cold shrinks stretched panel areas to proper contour.
6.6 Mixes and applies body filler.
6.7 Rough sands body filler to contour; finish sands.
6.8 Determines the proper metal finishing techniques for aluminum.
6.9 Determines proper application of body filler to aluminum.

SAMPLE PERFORMANCE TASKS

- Heat shrink a stretched panel area.
- Determine need for body filler on a damaged vehicle. Apply body filler to damaged area.

INTEGRATION LINKAGES

Math, Science, Chemistry, Physics, Communication Skills, Teamwork Skills, Reading Skills, Leadership Skills, Problem Solving and Critical Thinking Skills, computer Skills, Art and Design, Computer Aided Design, Secretary's Commission on Achieving Necessary Skills (SCANS), National Institute for Automotive Service Excellence, (ASE) National Automotive Technician Education Foundation (NATEF), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), SkillsUSA

COLLISION REPAIR: NON-STRUCTURAL

STANDARD 7.0:

Students will demonstrate proper procedures for movable glass and hardware.

LEARNING EXPECTATIONS

The student will:

7.1 Inspect, adjust, repair or replace window regulators, run channels, glass, power mechanisms, and related controls. HP-I

7.2 Inspect, adjust, repair, remove, reinstall, or replace weather-stripping. HP-G

7.3 Inspect, repair or replace, and adjust removable power operated roof panel and hinges, latches, guides, handles, retainer, and controls of sunroofs. HP-G

7.4 Inspect, remove, reinstall, and align convertible top and related mechanisms. HP-G

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

7.1 Inspects, adjusts, repairs or replaces window regulators, run channels, glass, power mechanisms, and related controls.

7.2 Inspects, adjusts, repairs, removes, reinstalls, or replaces weather-stripping.

7.3 Inspects, repairs or replaces, and adjusts removable power operated roof panel and hinges, latches, guides, handles, retainer, and controls of sunroofs.

7.4 Inspects, removes, reinstalls, and aligns convertible top and related mechanisms.

SAMPLE PERFORMANCE TASKS

- Replace a front door and a rear door window regulator.
- Remove and replace a sunroof.
- Reprogram a convertible top using a scan tool.

INTEGRATION LINKAGES

Math, Science, Chemistry, Physics, Communication Skills, Teamwork Skills, Reading Skills, Leadership Skills, Problem Solving and Critical Thinking Skills, computer Skills, Art and Design, Computer Aided Design, Secretary's Commission on Achieving Necessary Skills (SCANS), National Institute for Automotive Service Excellence, (ASE) National Automotive Technician Education Foundation (NATEF), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), SkillsUSA

COLLISION REPAIR: NON-STRUCTURAL

STANDARD 8.0

Students will properly perform welding and cutting techniques for collision repair.

LEARNING EXPECTATIONS

The student will:

8.1 Identify weldable and non-weldable substrates used in vehicle construction. HP-I
8.2 Weld and cut high-strength steel and other steels. HP-I
8.3 Weld and cut aluminum. HP-G
8.4 Determine the correct GMAW (MIG) welder type, electrode, wire type, diameter, and gas to be used in a specific welding situation. HP-I
8.5 Set up and adjust the GMAW (MIG) welder to "tune" for proper electrode stickout, voltage, polarity, flow rate, and wire-feed speed required for the substrate being welded. HP-I
8.6 Store, handle, and install high-pressure gas cylinders. HP-I
8.7 Determine work clamp (ground) location and attach. HP-I
8.8 Use the proper angle of the gun to the joint and direction of gun travel for the type of weld being made in the flat, horizontal, vertical, and overhead positions. HP-I
8.9 Protect adjacent panels, glass, vehicle interior, etc., from welding and cutting operations. HP-I
8.10 Protect computers and other electronic control modules during welding procedures. HP-I
8.11 Clean and prepare the metal to be welded, assure good metal fit-up, apply weld- through primer if necessary; clamp or tack as required. HP-I
8.12 Determine the joint type (butt weld with backing, lap, etc.) for weld being made. HP-I
8.13 Determine the type of weld (continuous, stitch weld, plug, etc.) for each specific welding operation. HP-I
8.14 Perform the following welds: continuous, plug, butt weld with and without backing, fillet, etc. HP-I
8.15 Perform visual and destructive tests on each weld type. HP-I
8.16 Identify the causes of various welding defects; make necessary adjustments. HP-I
8.17 Identify cause of contact tip burn-back and failure of wire to feed; make necessary adjustments. HP-I
8.18 Identify cutting process for different substrates and locations; perform cutting operation. HP-I
8.19 Identify different methods of attaching non-structural components (squeeze type resistant spot welds, riveting, non-structural adhesive, silicon bronze, ect.). HP-G

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

8.1 Identifies weldable and non-weldable substrates used in vehicle construction.
8.2 Welds and cuts high-strength steel and other steels.
8.3 Welds and cuts aluminum.
8.4 Determines the correct GMAW (MIG) welder type, electrode, wire type, diameter, and gas to be used in a specific welding situation.

8.5 Sets up and adjusts the GMAW (MIG) welder to "tune" for proper electrode stickout, voltage, polarity, flow rate, and wire-feed speed required for the substrate being welded.
8.6 Stores, handles, and installs high-pressure gas cylinders.
8.7 Determines work clamp (ground) location and attach.
8.8 Uses the proper angle of the gun to the joint and direction of gun travel for the type of weld being made in the flat, horizontal, vertical, and overhead positions.
8.9 Protects adjacent panels, glass, vehicle interior, etc., from welding and cutting operations.
8.10 Protects computers and other electronic control modules during welding procedures.
8.11 Cleans and prepares the metal to be welded, assures good metal fit-up, apply weld-through primer if necessary; clamps or tacks as required.
8.12 Determines the joint type (butt weld with backing, lap, etc.) for weld being made.
8.13 Determines the type of weld (continuous, stitch weld, plug, etc.) for each specific welding operation.
8.14 Performs the following welds: continuous, plug, butt weld with and without backing, fillet, etc.
8.15 Performs visual and destructive tests on each weld type.
8.16 Identifies the causes of various welding defects; makes necessary adjustments.
8.17 Identifies cause of contact tip burn-back and failure of wire to feed; makes necessary adjustments.
8.18 Identifies cutting process for different substrates and locations; performs cutting operation.
8.19 Identifies different methods of attaching non-structural components (squeeze type resistant spot welds (STRSW), riveting, non-structural adhesive, silicon bronze, etc.).

SAMPLE PERFORMANCE TASKS

- In a team determine need for welding operations for a damaged vehicle.
- Prepare work area for the appropriate welding operation.
- Correctly demonstrate the weld.

INTEGRATION LINKAGES

Math, Science, Chemistry, Physics, Communication Skills, Teamwork Skills, Reading Skills, Leadership Skills, Problem Solving and Critical Thinking Skills, computer Skills, Art and Design, Computer Aided Design, Secretary's Commission on Achieving Necessary Skills (SCANS), National Institute for Automotive Service Excellence, (ASE) National Automotive Technician Education Foundation (NATEF), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), SkillsUSA

COLLISION REPAIR: NON-STRUCTURAL

STANDARD 9.0

Students will demonstrate proper procedures for repairing plastics and adhesives.

LEARNING EXPECTATIONS

The student will:

9.1 Identify types of plastics; determine repairability. HP-I
9.2 Clean and prepare the surface of plastic parts; identify the types of plastic repair procedures. HP-I
9.3 Repair rigid, semi-rigid, or flexible plastic panels. HP-G
9.4 Remove or repair damaged areas from the rigid exterior composite panels. HP-G
9.5 Replace bonded rigid exterior composite body panels; straighten or align panel supports. HP-G

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

9.1 Identifies types of plastics; determines reparability.
9.2 Cleans and prepares the surface of plastic parts; identifies the types of plastic repair procedures.
9.3 Repairs rigid, semi-rigid, or flexible plastic panels.
9.4 Removes or repairs damaged areas from the rigid exterior composite panels.
9.5 Replaces bonded rigid exterior composite body panels; straightens or aligns panel supports.

SAMPLE PERFORMANCE TASKS

- Use reference materials to determine procedures for non-structural analysis and damage repair.
- Work as a team member to develop an analytical strategy.
- Use blueprints and diagrams to execute a task.

INTEGRATION LINKAGES

Communication Skills, Teamwork Skills, Computer Skills, Reading and Writing Skills, Language Arts, Problem Solving, Interpersonal Skills, Employability Skills, Critical-Thinking Skills, SCANS (Secretary's Commission on Achieving Necessary Skills), National Institute for Automotive Service Excellence, National Automotive Technician Education Foundation, SkillsUSA, AYES curriculum

COLLISION REPAIR: NON-STRUCTURAL

SAMPLING OF AVAILABLE RESOURCES

Enhanced Delivery I-Car Curriculum, I-CAR

Auto Collision Curriculum Guide, Instructional Materials Laboratory (IML), University of Missouri

Professional Automotive Collision Repair, 2nd Ed, Duffy, Delmar Publishing

Auto Body Repairing and Refinishing, Goodheart-Willcox, 2000.

Teacher Web resources:

Math/Science Web Site http://enc.org

National Science Teachers Association http://www.nsta.org/store

Center for Occupational Research and Development (CORD) http://www.cord.org/

Delmar International Thomson Learning http://www.delmar.com/

University of Missouri Instructional Materials Lab (IML)
http://www.iml.coe.missouri.edu/

Oklahoma Curriculum Instructional Materials Center (CIMC)
http://www.okvotech.org/cimc/home.htm